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## Serie Research Memoranda

### Parallels between Food and Information an Exploratory Essay

Michael S. H. Heng  
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# Parallels between Food and Information

▪ an Exploratory Essay'

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## *Abstract*

This essay argues that beyond certain level of information supply, the issue is no longer the need for more information, but the ability to use the information. In fact, one-sided emphasis on the supply side of information distracts us from the problem of use of information for the intellectual growth of the users. The discussion is conducted with analogical references to food. An examination of the consumption side of information gives us some insights into the problem of how to supply useful and high quality information to the information receivers. It is a piece of re-thinking about information beyond the context of technology, organisation efficiency and business competitive advantage. It is an exercise in reflecting on issues fundamental to IS including human judgement, the roles of fact, knowledge, reason and human activities.

**key words:** Information quality, information society, information and communication technology, meaning, interpretation, information overload.

## INTRODUCTION

There is a tendency among ICT (information and communication technology) enthusiasts to show a kind of information fetish thinking. It celebrates the deluge of information for its own sake. It betrays a sort of linear logic ▪ the more information the better. It does not discriminate between different types of information, and it shows a somewhat simplistic assumption of the roles of information in our intellectual development. The point of departure of this paper is to use parallels between food and information as a contribution to the critical discourse on what has come to be known as the information revolution. The approach is not totally original; Plato and Descartes

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<sup>1</sup> An earlier and shorter version of this essay was presented as a research paper at the Eight Australasian Conference on Information Systems, 29 September - 2 October 1997, Adelaide



have referred metaphorically to knowledge as the food for our mind (Floridi 1996). The essay is a piece of re-thinking about information beyond the context of technology, organisation efficiency and business competitive advantage. It is an exercise in reflecting on issues fundamental to IS including human judgement, the roles of fact, knowledge, reason and human activities.

Our natural languages provide us with some examples suggesting parallels between information and food. The English language has the following expressions: “food for thought”, “a book difficult to digest”, “a hungry reader”, “a poisonous idea”. The Chinese have a proverb which says, “Every book must be chewed to get out its juice.” If we search hard enough, we would find that other languages have various expressions reflecting the parallels between food and information. Scholars of theology would perhaps remind us of the apple as the symbol of knowledge in the biography of Adam and Eve. Students of natural sciences would have noticed the role of the falling apple which, according to one account, triggered Newton’s discovery of the law of gravitation. Is it not intriguing that the Apple computer is closely associated with the information society? The answer is perhaps best left to the Jungian psychologists.

We argue that beyond certain level of information supply, the central issue is no longer the need for more information, but the ability to use the information. In fact, one-sided emphasis on the supply side of information distracts us from the more crucial question in the information-rich societies, namely the issue of the ability of information receiver to discriminately use the information for their own development and for the benefit of the community. A critical examination of the consumption side of information can give us some interesting insights into the problem of how to supply useful and high quality information to the information receivers. Besides informing the receiver, a piece of information should serve to exercise his mind, to stimulate him to reflect and to push him to think a little deeper.

## **THE PROMISED LAND OF INFORMATION**

There is a body of literature describing the glorious society waiting for us when we have

access to more information. Below we list some of these grand statements made in connection with the ICT phenomena:

1. Easy access to information will foil the attempts of totalitarian regimes to dictate what people can know and to impose secrecy in order to restrict freedom, which Winner(1986) describes as the upbeat prediction of some visionaries. With the advent of the cyberspace comes the creation of a new civilization, founded in the eternal truths of the American Idea (Dyson et al 1996).
2. TV and electronic voting will promote a renewed sense of political involvement, thereby giving politics greater depth and dimension (Licklider 1979, quoted in Winner 1986).
3. Information will become the dominant form of wealth. ICT will help to replace the obnoxious forms of social organizations associated with traditional form of property (Naisbitt 1984).
4. Most boring jobs can be done by machines; lengthy commuting can be avoided; we can have enough leisure to follow interesting pursuits outside our work; environmental destruction can be avoided; the opportunities for personal creativity will be unlimited (Martin 1981).
5. In the ICT era, there is freedom for each of us to set individual goals of **self**-realization and then perhaps a worldwide religious renaissance, characterized by awe and humility in the presence of the collective human spirit and its wisdom, humanity living in a symbolic tranquillity with the planet we have found ourselves upon, regulated by a new set of global ethics (Masuda, quoted in Feigenbaum and McCorduck 1983).

The list can go on. The optimistic and enthusiastic anticipation of the future based on ICT is founded on a similar kind of reasoning as “we need information, so the more the better.” (It is rather like “we need food, so the more the better.”) The flaw of such thinking is noticed by **Drucker** (1990) who warns of the danger of producing a society of schooled barbarians in the midst of an overflow of information. While ICT has moved us from a world in which information was a scarce valuable item to an information-rich world, what becomes scarce is the capacity and capability to attend to the mass

of information. This phenomenon is captured in the following remark of Herbert Simon, himself a moderate ICT enthusiast: “What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it (quoted in Varian 1995).” A stronger statement is made by Postman (1992) who warns that the problem in the First World is no longer information scarcity, but information chaos, information without meaning, information without control mechanisms.

## **WE CERTAINLY NEED INFORMATION**

The critical remarks in above section should not be read as a denial of the value of information. We certainly do need information. In a way our need for information is compellingly similar to our need for food. Denial of proper food can damage a person’s health. Likewise, denial of information can harm a person’s mental and cognitive well-being. Psychologists use the term sensory deprivation to describe the conditions caused by prolonged solitary confinement. The altered state of consciousness induced by sensory deprivation is characterized by (a) abnormal rates of brain waves, (b) a decrease in skin resistance, e.g. increased arousal, (c) boredom, apathy, and a state of motivational loss that appears as aimless mind wandering, reverie, and fantasy activity (Goldberger 1977). Some modern dictators and authoritarian regimes which wish to avoid leaving physical scars on the bodies of their political prisoners too often resort to the simultaneous denial of food and information from their victims.

The use of need above refers to the need to survive. Besides this notion there is the notion associated with satisfaction. Delicious food appeals to our taste buds even though we are not hungry, and often such taste can be influenced. Hence there is a tendency for some to desperately need to consume junk food even though the eater is not hungry. Need that is born out of satisfaction may threaten the first kind of need, the need to survive in the long term. The need to satisfy can also be found in information consuming, e.g. reading of gossip stories or sex magazines.

## PURE FOOD, INNOCENT INFORMATION AND OTHER PARALLELS

We certainly need food to survive, and the food should preferably be reasonably clean (but *not perfectly* clean) and of diverse variety. It should be enough but not excessive, and what has come to be known as healthy food. In the same way, we need information to develop intellectually and stay healthy psychologically. We need a certain amount of information, but not too much. If we receive always clean and innocent information, our ability to interpret information may degrade. It is rather similar to the negative aspects associated with consuming pure carbohydrates, pure protein and pure vitamins, which leaves us with a weaker immune system. Furthermore, we need to differentiate information associated with philosophic wisdom and instruction from information associated with satisfaction of vulgar curiosity, very much like the need to differentiate nourishing food from junk food.

The nourishment we obtain from what we eat depends on the way it is harvested, preserved and prepared. It also depends on the way we eat it. Diamond (1985) for example advises a regime of fruits for breakfast, avoid eating carbohydrates with meat or other animal proteins, etc. An interesting idea here is that given a certain amount of food, the value or the nourishment we derive from it depends partly on how we consume it. Its parallel in information is found in case study, history and other events with a paucity of details. How do we extract as much insight as possible from unique cases? It depends on the methods which we employ to understand it. One method is to understand the case richly by integrating details, paying attention to the context, etc. Another way is to increase the number of interpretations of the event; it will often result in greater net return than will increasing the number of observations (March 1994).

“Variety is the spice of life” sings the paean of diversity. The adage applies not only to food, but also to information and knowledge. We thrive better on a varied and balanced diet. The same applies to information supply, which argues for well selected and balanced information. We often hear of how important it is to be exposed to a balanced account of an event in order to arrive at the true picture. A wide reading helps to broaden the mind.

To exercise the mind (or as someone aptly phrases it, “to massage the brain”), we have

to read original works of great thinkers, just like it is good for our digestive system to eat whole grain rice, and fresh vegetables. The need to exercise the mind takes on extra significance in this age of mass consumption of information. Students too often graduate with a master degree without ploughing through one volume of the original works of a classics master, let alone a number of them. We ought to pay serious heed to the exhortation of Kumarajiva of the fifth century, one of the greatest translators of Buddhist texts into Chinese. He said that the work of translation is just like chewing food that is to be fed to others. If one cannot chew the food oneself, one has to be given food that has already been chewed. Such food is bound to be poorer in taste and flavour than the original (Fung 1948).

Of course, we often have to rely on translated works, which though not as fulfilling as the originals, help to expand our outlook. Another sort of “pre-digesting” is the function of textbook writers and of teachers teaching introductory courses. In the same way, food treated for easy digestion expands the range of food for those with weak stomach. For instance, infants and old people can only cope with more digestible food. Some animals chew the food and by doing so pre-digest it before feeding it to their young ones.

And there is the importance of regular meals for our health. This appears to correspond to the practice of school teachers in assigning regular homework as a way of imparting knowledge to students and cultivating a habit of regular study among them.

Before leaving this section, we would like to mention that both food and information possess symbolic meanings, and one can decipher these meanings only if one knows the cultural background and context. For example, March (1994) discusses the following symbolic value of information in decision making:

- gathering and use of information as part of the pursuit of symbolic meaning rather than as part of the resolution of decision uncertainty
- gathering information and making decisions are signals and symbols of competence
- the possession and exhibition of information symbolizes and demonstrates the ability and legitimacy of decision makers



- the process of decision making has both symbolic and substantive pleasures.

The same seems to hold true for food. See for example Zubaida and Tapper (1995). They suggest that food is a language in the sense that it conveys meanings. Having a meal together expresses a sort of identity and equality which the participants jointly experience. A classic case is provided by the elaborate meals in religious festivals such as the feast to mark the end of Ramadan.

### **BEYOND A CERTAIN LEVEL OF INFORMATION CONSUMPTION . . . . .**

Beyond a certain level of information availability, the ability to use the information intelligently is much more important than obtaining more information. The late Nobel physics laureate Richard Feynman is known not to have the habit of devouring vast amount of research literature of physics (Gleick 1992). Likewise, to get the best benefit of food, a person selectively samples small amount of delicious and healthy food, paying more attention to its food value and composition rather than quantity. And he takes care to keep himself fit so as to get the best benefit of the eaten food. The food in turn provides all the necessary nourishment to keep him fit. So the relationship between food and health is a dialectical one. In the same fashion the relationship between our state of “knowledge and wisdom” and information is dialectical, mediated through our psychological characteristics e.g. being open-minded rather than dogmatic, comfortable with apparently contradictory information. Here we would like to cite F. Scott Fitzgerald: “The test of a first-rate intelligence is the ability to hold two opposed ideas in mind at the same time and still retain the ability to function.” (quoted in Morgan 1989).

#### ***Ability to use information***

As suggested earlier, having information is not the same as having the ability to use it properly, let alone critical thinking, enlightenment and wisdom. Plenty of information does not imply knowledge and the ability to use it, let alone wisdom. In this context, it

is sobering to read the following passage from **Mumford** (1970): “Unfortunately, ‘information retrieving,’ however swift, is no substitute for discovering by direct personal inspection knowledge whose very existence one had possible never been aware of, and following it at one’s own pace through the further ramification of relevant literature. But even if books are not abandoned, but continue their present rate of production, the multiplication of microfilms actually magnifies the central problem - that of coping with quantity-and postpones the real solution, which must be conceived on quite other than purely mechanical lines: namely, by a reassertion of human selectivity and moral self-discipline, leading to continent productivity. Without such self-imposed restraints the overproduction of books will bring about a state of intellectual enervation and depletion hardly to be distinguished from massive ignorance.”

The poet Thomas S. Eliot may be said to have anticipated this problem in his poem *The Rock* (1934), quoted in Bell (1979):

Where is the Life we have lost in living?

Where is the wisdom we have lost in knowledge?

Where is the knowledge we have lost in information?

### ***Fasting and Meditation***

Here we wish to briefly consider the case of intended isolation from information. For someone whose brain has been sufficiently stimulated by information to attain its developed stage (in the biological sense), deprivation of information carried out on purpose, to wit, meditation can be useful to the intellectual well-being of a person, to the creativity of poets and artists who use the occasion of solitude to reflect on their inner life. In a way, it is very similar to the practice of fasting. Incidentally, meditation and fasting are advocated by some religions as a way to improve the all-rounded well-being of an individual. Founders of religions like the Buddha and Prophet Mohammed were known to retreat into seclusion, to shut themselves from information as it were, in order to gain insights into the most profound questions of human existence. Hermits and the great mystics choose to cast themselves out of society to live in solitude in order to gain inner experience. Lest one should think of such practice as phoney, hermits are often

sought after by the rest of humanity for advice on how best to live within society (France 1996). Mediation may be seen as a gateway to knowledge by faith or through grace and inspiration.

As any practitioner of meditation can testify, meditation is really hard work. Such efforts to strive for sublime wisdom and enlightenment requires discipline, concentration and persistence as well as right moral attitude. The importance of moral attitude extends beyond the realm of search for knowledge to the use of it. Samuel Johnson (1759) is nearest the mark in expressing the link between knowledge and its use: "Integrity without knowledge is weak and useless, and knowledge without integrity is dangerous and dreadful." Such line of thinking, embodied in the form of the oath of Hippocrates, has strengthened our confidence in the world of medical practice. Another related notion is an ancient Greek ideal - the inseparable relation between truth and beauty. John Keats tells us in his poem (Gardner 1972, p.608) :

Beauty is truth, truth beauty, that is all

Ye know on earth, and all ye need to know.

Here we are touching part of an ancient philosophical enquiry, one that concerns the relation of morality to truth and beauty. "The true, it has been said, is the good in the sphere of our thinking. So it may be said of the beautiful that it is the quality which things have when they are good as objects of contemplation and love, or good as productions. It is no less possible to understand goodness and beauty in terms of truth, or truth and goodness in terms of beauty (Adler 1989)." The tripartite relationship of truth, beauty and morality is more than a metaphysical one. It not only occupies a central position in aesthetics and philosophy of art, it appears again and again in economics, politics, jurisprudence, psychology, sociology and history. With a bit of imagination, one does not need to be a Greenpeace activist to realize that good environmental policy in agriculture (be it farming or fishing) returns us food that is pleasing to our eyes and nourishing for our system.

Another phenomenon that defies the logic of consumerist perspective of information is intuition. It is beyond the scope of this paper to dwell further on it. Interested readers

may wish to refer to works in this area, e.g. Koestler (1964) and Ohmae (1982).

## **ELUSIVE LINK BETWEEN INFORMATION AND KNOWLEDGE**

It is a very attractive idea to say that good information leads to intelligent decision. The link between the two may be described as elusive and has to be demonstrated rather than assumed (March 1994). The same may be said of the relationship between information and knowledge.\* The advent of the Internet does not render our argument defunct. The net provides easy access to seas and mountains of information, but not the help to know how to identify the useful information, and to draw implication and meaning from it. The investor Warren Buffett may have the same information as other investors, but how he uses it is pretty different (Hagstrom 1994). Moreover, information publicly available may be ambiguous, not accurate and sometimes plainly false. A well-stock library does not in itself make a good consultancy bureau, nor a top rate university. “The appropriation of knowledge involves awareness of the existence of relevant knowledge, access to the knowledge and the capability to use it. None of these is assured (March 1995).” ICT has helped to overcome many problems associated with access to information and knowledge. But its record in the areas of locating it and assimilating it is much poorer. This is true of individuals as well as organizations. Using new knowledge, for example, is likely to require considerable prior knowledge, and organizations that fall behind in competence will find it difficult to appropriate the knowledge of others, even if they have access to it (Cohen and Levinthal 1989).

In a very real sense of the word, we are participating in an age-old debate on the nature of our knowledge. How do we arrive at knowledge? Is our knowledge reliable? What is the scope of our knowledge? Questions like these form central themes in epistemology

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<sup>2</sup> The concepts of information and knowledge overlap each other, as for example those provided by Webster’s new Encyclopedic Dictionary (1993). Here we adopt a common definition of information in Information Systems, namely information as data in a form that is meaningful to human beings. Knowledge refers the understanding about something. It is admittedly difficult to provide clear cut definitions which would please everyone; what we hope to do here is to assist the flow of argument.

and can be found in many standard philosophical textbooks. See for example Copleston (1985). To put it in a rather simplified way, the debate has been conducted by two opposing camps - the empiricists and the rationalists. The former, represented by Locke, Berkeley and Hume, argue that sense experience is the primary source of our ideas, and hence knowledge. The empiricists insist that there cannot be any knowledge prior to any sense experience or information from the external world. This position supports the views of ICT enthusiasts about the immense benefits information can mean to whole humanity. Opposite to this camp is the camp of rationalists represented by Plato, Descartes, Spinoza and Leibnitz. They argue that ideas of reason intrinsic to the mind are the only source of knowledge.

A major attempt is made by Kant to seek a grand reconciliation, aiming to integrate the key features of these two opposing camps. In a famous and often quoted passage in the *Critique of Pure Reason* (1781), he says, "That all our knowledge begins with experience there can be no doubt . . . But though all our knowledge begins *with* experience, it does not follow that it all arises *out of* experience." He agrees with the empiricists to the extent that all our knowledge begins with experience, because the cognitive faculty requires to be brought into exercise by our senses being affected by objects. With external sensations or experience, the mind can set to work. However, the mind is antecedent to experience, it is possible that the cognitive faculty supplies a priori elements from within itself on the occasion of the sense impressions. It is in this sense that a priori elements would not be derived from experience. In other words, not all knowledge must be premised on sense experience or on information originating from the external world. He suggests that the way we perceive the world, and reflect upon objects may itself have a structure which in some way moulds our experience. This position recognizes the importance of information, but it is much more subdued than that of ICT enthusiasts.

Of a more recent date, we refer to contributions from phenomenology. The phenomenologist Husserl sees meaning as not something confined to empirical actualities but unfolds in a free play of pure possibilities. For phenomenology the science of facts becomes, as it were, an art of fictions. Thus, **Husserl**( 1913) could affirm the phenomenologist's interest in the "rich use of fiction for perfect clarity and the free

transformation of data”, adding that “we can draw extraordinary profit from what art and particularly poetry have to offer us in this regard.” Without the freedom of imaginary variation, exploration and description, we would never be in a position to transcend the limits of particular empirical facts so as to intuit universal essences. In short the truth of the real is most fully attained through the symbolic. He remarks in ***Ideas*** that : “If anyone loves a paradox, he can really say, and say with strict truth if he will allow for the ambiguity, that the element which makes up the life of phenomenology as of all essential science is ‘fiction’, that fiction is the source whence the knowledge of ‘external truths’ draws its sustenance.”

### **SOME REMARKS ON INFORMATION SUPPLY**

Just like food may be judged by its appearance, taste, digestibility and health value, a piece of information may be judged by its presentation, interestingness, readability, and informative/ intellectual value. The moral of this analogy for information producers is that they have to produce information that:

- a) is pleasant to the eyes and ears, e.g. a beautiful poem;
- b) is not boring to read, e.g. use of lively prose;
- c) is easy to read (this is of course related to its contents);
- d) is useful to the information consumer.

Just like different people have different taste preferences, there are differences in the preferences among people for format of presentation - some like pie chart, some like histogram, some like hard facts while others prefer anecdotes.

This is essentially a question of form and content of information, which is treated next.

#### ***Content and form***

A piece of information is valued for its factual fidelity and its ability to exercise and appeal to the minds of the receivers. Sometimes the two aspects may not be compatible. A good case is provided by novel, mythology and poetry. The mind-expanding and mind-exercising capability of poetry is well articulated by March (1994) who refers to

its evocative ambiguity in stimulating and promoting our understanding. “Evocative ambiguity uses language (or other media) to stimulate meaning. **Rich** meanings are drawn from the resonances and deep structure of language, meanings that are not transparent to the writer or speaker but are generated from the particular language chosen. Communications, in these terms, is the art of crafting such evocativeness . . . The poet creates meaning without fully comprehending the meaning that has been created, but the words are chosen carefully to elicit the imagination of language. Poetry and art encourage the simultaneous adoption of a vision and the recognition of its unreality. They affirm life in the face of absurdity. They are comfortable with multiple, contradictory meanings and with the simultaneous truth and falsity of beliefs.”

Literature is based on facts but it does not and (in the views of many people) should not contain real facts in the forms of names, exact dates, etc. However, we all recognize that a well-written piece of literature is the work of a sensitive observer and careful chronicler of significant social moods, habits and events. In this sense, the novels of Honore de Balzac (b. 1799 - d. 1850) are as instructive as the many scholarly sociological papers on the French society during Balzac’s times. As such novels can sometimes be used as input for even academic research which has a strong tradition of relying on empirical facts and figures. This is obviously appreciated by Grey (1996) who argues for the case of using fiction in the study of management and organizational analysis. He uses the novelist C P Snow’s ***Strangers and Brothers*** as a resource material to demonstrate aspects of organizational life and the social practices of managers. In doing so, Grey is not suggesting that this entails the realist novel as a mirror of reality. “Instead, what is important about the realist novel is its aspiration to be realistic. In other words, included in what realist novels tell us about the reality they purport to represent is the intention of such a representation - the mirror, as much as the reflection, forms part of the resource to be analyzed. This implies the necessity of seeing the novel and its author in their specific social, historical and cultural context. “ He goes on to suggest that the use of fiction as a resource to understand organizations is not confined to realist fiction but to fictional representations more generally. Here Grey is in the company of Jessamyn West (1998) who is quoted to remark, “Fiction reveals truth

that reality obscures.”<sup>3</sup> In psychology (a field very closely related to organizational studies), it goes back at least as early as the works of the distinguished psychologist Carl Jung who was able to appreciate mythology as a source of ideas.

In a similar vein, one may present one’s ideas in plain facts and figures or in symbolic language or novels. Indeed, a novel containing a rich description of the complex nature of information systems activities, in imitation of Leo Tolstoy’s *War and Peace*, would provide much more insights and ideas to the information systems community than numerous volumes of Ph D theses. Interesting writing should not limit itself to relating facts. If one can accept that knowledge is not only defined as demonstrable facts but also as stories about the world, then one can have sympathy for the value of the approach used here. Put it differently: if we are not too fussy about the semantic problem of what is fact and what is knowledge, then we may assert that we can learn real facts of life from fictions. Likewise we can read many fictions based on real facts of life, for in real life facts are sometimes stranger than fictions.

## CONCLUSIONS

Drawing parallels between food and information is but only one way to re-think the scenarios depicted by ICT visionaries. Problems associated with technological innovations of our times can be revealed by critical reflection along general line or by taking a broad review of our cultural evolution (as opposed to biological revolution). The first approach is exemplified by the following passage from the 1997 Christmas speech of Queen Beatrix of the Netherlands: “A higher standard of living may go hand in hand with a deterioration of the environment, production of useless products for a throwaway society, banal forms of mass entertainment, greater dangers on the street and senseless violence. [...] *Contacts are hastier and communication **often** has less depth and feeling. Hand-written letters where care has been taken to express thoughts and feelings are becoming rare. No time is set aside for a good talk and the most important thing about a visit is that it should not last too long. Daily life is characterised not by progress, but by simple continuation . (emphasis added)*”

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<sup>3</sup> Forbes Global Business & Finance June 15, 1998



Another approach is to review the cultural achievements of human **civilisations** before the advent of modern ICT. Homer's *Odyssey* and *Iliad* are products of the oral tradition, i.e. before the advent of writing. And much of the most profound writings of human **civilisation** has been around before the invention of the printing press. In fact one is justified to be somewhat pessimistic when confronted with the use of ICT in weapon systems of mass destruction, in promoting consumerism and in surveillance systems.

Coming back to the main theme of the essay and by way of conclusion, we would like to mention three points:

1. Drawing parallels is a sort of analogical reasoning, with all the limitations thereof. An analogy is like an old bicycle - it cannot carry you too far. We are not implying that information and food share all common features. Though it has been easier to detect similarities between the consumption of information and food, it is much more problematic to do the same for the production aspect. Moreover, there are objects other than food that can offer interesting parallels for information. Coming to mind is the case of clothing which has a strong symbolic dimension. Just like information, it conceals as well as reveals.
2. It is the explicit aim of this essay to offer a critique of the celebration of information fetishism. However it is also a modest attempt to add depth and richness to our understanding of the use of information. This aspect should not only be important to parents, teachers and sociologists. It is equally relevant to the business world. Mason (1985), in reviewing the importance of ICT to business strategy, lists three forces which account for most of the convergence of business strategy with organizational structure and information systems. The three forces are: (a) rapid innovation of new information technologies (b) widespread creation of new ideas and concepts about information itself, and (c) extensive development of new information-intensive organizational forms and business strategies.
3. A rethinking of the use of information as we do here suggests some insights for evaluating information. There is a strong tradition in information systems, originating partly from accountancy, to emphasize the "factual value" of information or the criteria that information must be correct, at the right time and at the right

place. Here we suggest that in the softer aspects of organizational and societal life, we ought to look at the mind exercising aspect of a piece of information. A piece of informative work, be it a company's policy document or a scientific paper, should be judged on its role in shaping the mind of the readers. In our field, the works of McLuhan (1962, 1964) fall into this category. Ignoring the light-heartedness of much of what he said - which has the character of after-a-good-dinner musings, and trying to pick out germs from him, then McLuhan is a good read. In the words of Steiner (1967): "Indeed, it is often in the throw-away suggestion, in the local perception, that McLuhan is most interesting. ... It is quite possible that **McLuhan's** own sermons will soon be rejected as chaotic and self-contradictory; but the process of rejection will almost certainly be creative of new insight. That, and not any academic canon of definitiveness, is the mark of significant work."

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